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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/577,805 05/24/00 HANSEN

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021186 MM91/0829
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EXAMINER

JONES, J

ART UNIT

PAPER NUMBER

2834

DATE MAILED:

08/29/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/577,805

Applicant(s)

HANSEN ET AL

Examiner

Judson H. Jones

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-74 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 32-72 and 74 is/are allowed.
- 6) ☒ Claim(s) 1-3, 7, 10-31 and 73 is/are rejected.
- 7) ☒ Claim(s) 4-6, 8 and 9 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 14-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
2. In claim 14 the language "means for providing a passageway" is unclear. Conceivably this could mean something like a machine for extruding tubing or a drill bit for making a hole in the device where a tube is to be inserted. In the broadest sense, passageways always exist unless something blocks the way and thus the limitation is meaningless. If the words were removed, the sentence would read "... for use with a cooling fluid, the transducer including a passageway about the transducer ..."
3. In claim 20 the language "means for forming a passageway" is unclear. Conceivably this could mean something like a machine for extruding tubing or a drill bit for making a hole in the device where a tube is to be inserted. "Means for forming" seems to add nothing substantial to the sentence. If the words were removed, the sentence would read "... means for actively cooling the transducer which includes a fluid-carrying helical passageway which extends about the transducer ..."
4. In claim 24 the language of "means ... for forming a fluid-carrying helical passageway" is unclear. Also in claim 24 the limitation "means for supplying a sinusoidal electrical signal to the coil" appears twice in the claim.
5. Claim 73 recites the limitation "the refrigerator system" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-3, 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abramov et al. in view of Sutcliffe et al. Abramov et al. discloses an ultrasonic transducer with either a magnetostrictive or piezoelectric transducer as described in the abstract with an acoustic elements 23, 24 as shown in figure 1 but does not disclose power in excess of three kilowatts or the presence of an electromagnetic field. However, Abramov et al. does mention using an ultrasonic device as a cleaning means. Added power would mean more cleaning ability so it would have been obvious for one of ordinary skill in the art to increase the power of an ultrasonic device in order to increase the cleaning ability of the ultrasonic device. The reason Abramov et al. does

Art Unit: 2834

not mention the electromagnetic field is because he is mostly concerned with the waveguide instead of the driving means for either a piezoelectric device or a magnetostrictive device. Sutcliffe et al. discloses an electromagnetic field producing device 28 for a magnetostrictive actuator as shown in figure 2. Since Abramov et al. and Sutcliffe et al. are both from the same field of endeavor, it would have been obvious for one of ordinary skill in the art to have utilized an electromagnetic field producing coil in the magnetostrictive embodiment of Abramov et al. because the device would not work properly without one.

4. In regard to claim 2, see Sutcliffe et al. figure 2.
5. In regard to claim 3 and 10, see Sutcliffe et al. column 4 lines 40-46.
6. Claim 7, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abramov et al. in view of Sutcliffe et al. as applied to claim 2 above, and further in view of Glass et al. Abramov et al. as modified by Sutcliffe et al. discloses the actuator but do not discuss flux return paths. However, Glass et al. teaches that a flux return path reduces leakage flux and provides maximum use of available magnetization in column 4 lines 8-13. Since Glass et al. and Abramov et al. as modified by Sutcliffe et al. are both from the same field of endeavor, it would have been obvious for one of ordinary skill in the art to have utilized a flux return in the device of Abramov et al. as modified by Sutcliffe et al. in order to provide maximum use of the available magnetization.
7. In regard to claim 30, see Sutcliffe et al. figure 1.

8. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abramov et al. as modified by Sutcliffe et al. and Glass et al. as applied to claim 29 above, and further in view of Fleteau et al. (cited by Applicant). Abramov et al. as modified by Sutcliffe et al. and Glass et al. discloses the actuator but does not disclose a permanent magnet disposed about the actuator. However, Fleteau et al. discloses a permanent magnet 19 surrounding magnetostrictive element 12 as shown in figure 1. Since Fleteau et al. and Abramov et al. as modified by Sutcliffe et al. and Glass et al. are both from the same field of endeavor, it would have been obvious for one of ordinary skill in the art to have utilized a permanent magnet surrounding an magnetostrictive element in the device of Abramov et al. as modified by Sutcliffe et al. and Glass et al. in order to provide a more uniform magnetic biasing of the magnetostrictive element.

9. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abramov et al. in view of Sutcliffe et al. as applied to claim 1 above, and further in view of Slaughter et al. Abramov et al. as modified by Sutcliffe et al. discloses the ultrasonic transducer but does not disclose using a material having a quarter resonant wavelength. However, Slaughter et al. discloses an ultrasonic device having a quarter resonant wavelength in column 7 lines 30-36. Since Abramov et al. as modified by Sutcliffe et al. and Slaughter et al. are both from the same field of endeavor, it would have been obvious for one of ordinary skill in the art to have utilized an element having a quarter resonant wavelength in order to size the element to vibrate at its resonant frequency when driven by a magnetostrictive device.

10. In regard to claims 12 and 13, see Slaughter et al. column 7 lines 21-22.

11. Claims 14, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abramov et al. as modified by Sutcliffe et al. as applied to claim 1 above, and further in view of Adames. Abramov et al. as modified by Sutcliffe et al. discloses the transducer but does not disclose a passageway about the transducer for receiving cooling fluid. However, Adames teaches liquid cooling of a electrodynamic machine in figure 1. Since Adames and Abramov et al. as modified by Sutcliffe et al. are both from the same field of endeavor, it would have been obvious for one of ordinary skill in the art to have utilized a cooling passageway in the device of Abramov et al. as modified by Sutcliffe et al. in order to increase the efficiency of the machine.

12. In regard to claims 18 and 20, see the helical passageway in Adames figure 1 and column 5 lines 51-67.

13. Claims 15-17 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abramov et al. as modified by Sutcliffe et al. and Adames as applied to claim 14 above, and further in view of Avakian et al. and Rusanova et al. Abramov et al. as modified by Sutcliffe et al. and Adames discloses the transducer with the cooling passageway but does not disclose a passageway formed from an electrical insulator. However, Adames teaches using a cooling tube made from stainless steel which is thermally conductive and corrosion resistant as described in column 11 line 66 to column 12 line 22. Avakian et al. raises another consideration for cooling tubes in column 4 lines 2-4, which is electrical isolation. Rusanova et al. teaches using hot pressed boron nitride in the electronic, electrical, radio, metallurgical, atomic and rocket

industries because the material is thermally conductive, corrosion resistant and electrically insulative and also teaches making tubing of boron nitride in column 9 lines 22-27. Since Rusanova et al. suggests using hot pressed boron nitride in electrical devices and since the material satisfies the requirements for coolant tubing in an electrical motor, it would have been obvious for one of ordinary skill in the art to have utilized boron nitride coolant tubes in the motor of Abramov et al. as modified by Sutcliffe et al. and Adames.

14. In regard to claim 16, boron nitride has a very high thermal conductivity, which is much greater than one w/m-K.

Allowable Subject Matter

15. Claims 4-6, 8, 9 and 22-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, provided the 112 rejections of claims 22-28 are overcome.

16. Claims 32-72 and 74 are allowed.

17. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not disclose or teach a magnetic means having first, second and central portions where the center portion has a radial thickness less than the radial thickness of the end portions as recited in claims 4 and 24. The prior art of record also does not disclose or teach first and second disk-like elements used for flux return elements having an electrical resistivity ranging about 0.01 ohm-cm and a magnetic flux density ranging from about 12,000 to 15,000 gauss as recited in claim 8.

The prior art of record also does not disclose or teach a helical passageway extending through a cylindrical actuation element made of a magnetostrictive material as recited in claims 22 and 23. The prior art of record also does not disclose or teach a plurality of sub-motors connected to a master wave-guide to channel ultrasonic energy to perform work as recited in claims 32 and 53.

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Smith et al. teaches cooling of magnetostrictive devices in column 5 lines 34-47. Greene teaches that a chiller is can be a refrigeration system in column 1 lines 12-16. Rathore et al. discloses a magnetostrictive device using plural magnetostrictive bodies F1, F2, F3 as shown in figure 1.

Any inquiry concerning this communication from the examiner should be directed to Judson H. Jones whose telephone number is (703) 308-0115. The examiner can normally be reached on M-F (8:00-4:30). If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Nestor R. Ramirez can be reached on (703) 308-1371. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular and After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JHJ *JHJ*
August 22, 2001

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